REMARKS

Claims 1-4 and 21-22 stand rejected under 35 U.S.C. 103(a) as obvious over Bertero et al. (U.S. Patent No. 6,150,015) in view of Bian et al. (U.S. Patent No. 6,143,388). Applicants respectfully traverse the rejection to claims 1-2 and 4 because the cited references do not disclose or suggest, among other things, a non-magnetic crystal layer containing a non-magnetic element at a first concentration level near the seed crystal layer, and at a second concentration level smaller than the first concentration level near the magnetic crystal layer, as recited in amended claims 1-2 and 4.

As disclosed in FIG. 5 of the present invention, the content of the non-magnetic atoms (or Cr atoms) in the intermediate non-magnetic crystal layer 32 gradually decreases from 100at% near the boundary of the Cr layer 31, to 35at% near the boundary of the $Co_{88}Pt_{12}$ layer 33 (see Applicants' specification, pg. 18, lns. 11-14). The Bertero et al. reference and the Bian et al. reference do not disclose or suggest these features. That is, a formation of a non-magnetic crystal layer interposed between the seed crystal layer and the magnetic crystal layer that have a first concentration level near the seed crystal layer and a second concentration level smaller than the first concentration level near the magnetic crystal layer. For these reasons, independent claims 1-2 and 4 are considered allowable.

In addition, the Examiner states that the Bian et al. reference teaches the equivalence of non-magnetic CoCr to magnetic CoCr as a nucleation layer for a magnetic layer. However, the Bian et al. reference only specifies the material of the onset layer. The

Bian et al. reference never discloses a nucleation layer, as in the present invention. While the Examiner considers the onset layer of the Bian et al. reference and the nucleation layer of the Bertero et al. reference to be equivalent, Applicants respectfully disagree. The function of the continuous layer is distinguishable from that of a discontinuous CoCr layer because when one controls the direction of the C-axis in the crystal grains, the CoCr should form a layer. For these additional reasons, amended claims 1-2 and 4 should be allowed.

Since claims 3 and 21-22 ultimately depend upon claim 1, they necessarily include all of the features of their associated independent claim plus additional features. Thus, Applicants submit that the §103 rejection of claims 3 and 21-22 have also been overcome for the same reasons mentioned above to overcome the rejections of independent claims 1-2 and 4. Applicants respectfully request that the §103 rejections of claims 3 and 21-22 also be withdrawn.

Claims 5-6, 13, and 22 stand rejected under 35 U.S.C. 103(a) as being obvious over Bertero et al., as modified by Bian et al., and further in view of Okumura et al. (U.S. Patent No. 5,700,593). In response, Applicants respectfully traverse the rejection to claims 5-6 and 22 for the reasons recited above with respect to the rejection of independent claims 1 and 4. That is, the cited references do not disclose or suggest a non-magnetic crystal layer having different concentration levels as recited in amended claims 1 and 4. Therefore, withdrawal of the §103 rejection to claims 5-6 and 22 is respectfully requested.

Applicants respectfully traverse the rejection to claim 13, as amended, because the cited references do not disclose or suggest a layered polycrystalline structure that includes, among other things, amorphous nucleation sites physically separated on a surface of the substrate at positions spaced from each other, as now recited in amended claim 13.

Amended claim 13 defines each nucleation site of the present invention as formed of an aggregation of atoms. These nucleation sites are spaced from one another on the surface of a substrate so that the nucleation sites never form a continuous layer. Accordingly, these discontinuous nucleation sites contribute to a reduction in size of the crystal grains in a continuous crystal layer covering the surface of the substrate.

In the Office Action, the Examiner considers the method of the Okumura et al. reference for forming the amorphous seed layer and underlayer as being substantially similar to that disclosed by Applicants. Applicants respectfully disagree with this characterization because the amount of the deposited Cr atoms is completely different than that disclosed by the Okumura et al. reference. If the thickness of a layer is set larger than 10nm (100 Angstroms), as disclosed in the Okumura et al. reference (Col. 5, lns. 15-17), then a continuous layer is formed. However, as disclosed in the Applicants' specification on pg. 23, line 23 an ultrathin film is formed in a sputtering apparatus that forms the Cr atoms at a thickness of 1.0nm. That is, the present invention sputters the Cr atoms at a thickness that is approximately one-tenth that of the Okumura et al. reference. Moreover, in the present invention Applicants disclose the ultrathin film of Cr being subjected to a heat treatment

prior to deposition of the crystal layer, unlike the Okumura et al. reference, which creates the nucleation sites recited in claim 13. Furthermore, even if a seed layer of the Okumura et al. reference is an amorphous layer, it is impossible to reduce the size of the crystal grains in the underlayer as long as the seed layer is a continuous layer. Therefore, since the continuous layer is distinguishable from a discontinuous or spaced nucleation sites when a crystal layer is formed thereon, as disclosed in amended claim 13, Applicants believe claim 13 is in condition for allowance. Accordingly, withdrawal of the rejection to claim 13 is respectfully requested.

For all of the above reasons, Applicants request reconsideration and allowance of the claimed invention. The Examiner should call Applicants' attorney if an interview would expedite prosecution.

Respectfully submitted,

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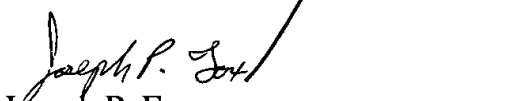
By 

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